



Guidance note on Sustainable Construction and Low and Zero Carbon Energy Generation

Guidance on preparing Sustainable Construction and Energy Statements

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Contents

1. Purpose of this document	3
2. Policy context	3
3. Policy TP3 Sustainable Construction	3
What development does Policy TP3 apply to?	3
Information requirements	3
What to include in a Sustainable Construction Statement	4
Maximising energy efficiency and carbon reduction	4
BREEAM Standard - Non-Residential development	5
4. Policy TP4 Low and zero carbon energy generation	7
What development does Policy TP4 apply to?	8
Information requirements	8
Definitions	8
Multiple building schemes	8
Energy Statements	8
District Heat Networks	11

Appendices

Appendix 1: Type of buildings that can be assessed using the BREEAM New Construction 2018 scheme version

Appendix 2: Energy Statements

1. Purpose of this document

- 1.1 This document provides detailed guidance on the application of Policy TP3 Sustainable Construction and Policy TP4 Low and Zero Carbon Energy Generation in the Birmingham Development Plan (BDP). It does not create new policy or place additional burdens on applicants; rather it explains what information is needed in order to demonstrate that the requirements of the policies will be met.
- 1.3 This guidance note sets out:
- The policy context;
 - What development the policies apply to;
 - The information required from applicants to demonstrate the policy has been met; and
 - How the information submitted will be assessed.

2. Policy context

- 2.1 The National Planning Policy Framework (February 2019) makes clear that the transition to a low carbon future and use of renewable and low carbon energy in a changing climate is a core planning principle of national planning policy.
- 2.2 The BDP sets out a development strategy and planning policies to ensure that development is appropriately located, designed, constructed and operated. BDP Policy TP1 provides an overarching policy which seeks to reduce the City's carbon footprint by 60% by 2027. BDP Policy TP2 set out measures that can help to manage the impacts of climate change. BDP Policy TP3 provides policy on Sustainable Construction and Policy TP4 on Low and Zero Carbon Energy Generation. This guidance notes deals specifically with the application of Policies TP3 Sustainable Construction and TP4 Low and Zero Carbon Energy Generation.

3. Policy TP3 Sustainable Construction

- 3.1 Policy TP3 sets out a number of ways in which development should be designed and constructed. The majority of the bullet points listed in Policy TP3 are cross-referenced to other BDP policies where further information is provided.

What development does Policy TP3 apply to?

- 3.2 Policy TP3 applies to all new development. However, for all applications for major development¹, information will be required to be submitted in accordance with the Local Validation Requirements https://www.birmingham.gov.uk/downloads/file/7362/local_validation_criteria_2020 Further detail is provided in this note.

Information requirements

- 3.3 Applicants can use the following statements to show how their proposals contribute to sustainable design and construction:
- A section within the Design and Access Statement; or
 - A separate Sustainable Construction Statement and separate Energy Statement; or
 - A combined Sustainable Construction and Energy Statement.
- 3.4 The level of information provided should be proportionate to the scale and nature of the development proposed.

¹ As defined by the Development Management Order.

What to include in a Sustainable Construction Statement?

- 3.5 The purpose of a Sustainable Construction Statement is to demonstrate that the proposed development will meet the highest standards of sustainable design and construction throughout all of the stages of the development, including demolition, construction and long-term management. The statement should contain the following sections:
- How the development maximises energy efficiency (can be covered in a Sustainable Construction or Energy Statement);
 - How the development maximises the use of low and zero carbon energy generation (can be covered in the Energy Statement);
 - How the development promotes Sustainable Urban Drainage Systems (SUDS) (as shown in a Sustainable Drainage Assessment and Operation and Maintenance Plan as required in the Local Validation Requirements);
 - How water is conserved, and flood risks are reduced in the development (as shown in a Flood Risk Assessment as required in the Local Validation Requirements);
 - The consideration of the procurement of materials which promote sustainability, including low impact, sustainably sourced, reused and recycled materials;
 - The minimisation of waste and the maximisation of recycling during the construction and operation of the development (see also BDP Policy TP13 Sustainable management of the city's waste);
 - The flexibility and adaptability of the development to future occupiers' requirements;
 - The measures taken to enhance biodiversity and the green infrastructure network (can be covered in a Sustainable Construction Statement);
 - How the development takes account of the natural features of a site (e.g. orientation and landscape) to minimise energy use;
 - How the development minimises the impact of overheating and aid cooling
 - The BREEAM pre-assessment report(s) and details of the credits proposed, using the most up to date version of the BREEAM manual.

Maximising Energy Efficiency and Carbon Reduction

- 3.6 In 2011, the coalition government made a commitment to deliver a Zero Carbon Homes policy by 2016. This was reflected in the BDP submission version 2013 and subsequently modified by the BDP Planning Inspector when it became uncertain as to when and if the policy would be introduced.
- 3.7 Policy TP3 was amended to state, *"From whatever date the Government prescribes for the introduction of zero carbon standards through the Building Regulations..."*
- 3.8 Paragraph 6.13 of the BDP states, *"In the case of new residential development, this will be achieved through energy performance standards applied through the Building Regulations in line with the Ministerial Statement of March 25th, 2015."*
- 3.9 In the Written Ministerial Statement (WMS), Government stated that *"local planning authorities...should not set...any additional local technical standards or requirements relating to the construction, internal layout or performance of new dwellings."* The exception was energy performance, where the WMS said that local authorities *"would continue to be able to require energy performance standards higher than Building Regulations up to the equivalent to Code for Sustainable Homes Level 4 until commencement of amendments to the Planning and Energy Act 2008."*

- 3.10 Amendments to the Planning and Energy Act 2008 have not been enacted, and the power afforded to local planning authorities through the Act to set energy efficiency standards in new homes still exist. Consequently, local planning authorities are able to set standards above the building regulatory minimum. While a specific carbon reduction target for new development has not been prescribed within the BDP policies, there is a clear policy expectation that carbon reductions should be achieved. Policy TP3 requires all new development is to be designed in ways that *“maximise energy efficiency and use low carbon energy.”*
- 3.11 Residential development should aim for at least a 19% reduction in carbon dioxide emission against the Target Emission Rate (TER) of the 2013 Edition of the 2010 Building Regulation (Part L) (i.e. equivalent to Code for Sustainable Homes Level 4 energy criteria) (UK Green Building Council, Core Cities UK, Town and Country Planning Association, Royal Town Planning Institute). However, a 19% reduction in carbon emissions should not be seen as a maximum. Furthermore, achieving at least a 19% reduction in carbon emissions (through energy efficiency) does not mean that Policy TP4 is waived. In accordance with Policy TP4, the Council will still expect developments to *“incorporate the provision of low and zero carbon forms of energy generation or to connect into low and zero carbon energy generation networks where they exist, wherever practicable and unless it can be demonstrated that the cost of achieving this would make the proposed development unviable.”*

BREEAM Standard - Non-Residential Development

- 3.12 The policy requires development to aim to meet BREEAM standard Excellent for non-residential built development. The timing of the application of this policy will not be predicated on Government introducing a residential zero carbon standard.

What development does this apply to?

- 3.13 The BREEAM requirement applies only to new non-residential buildings in excess of a total floor area of 1,000m² or a site having an area of 0.5 ha or more. This does not include changes of use or conversions. The standard applies to a range of non-residential development types including offices, schools, industrial, retail, but also applies to non C3 Residential Uses such as multi-residential and supported living developments, as set out in Appendix 1.

BREEAM Process

- 3.14 Building Research Establishment Environmental Assessment Method (BREEAM) provides assessments for a range of non-residential uses. Environmental performance is assessed by trained assessors against a range of categories. To gain a rating under BREEAM, various credits must be achieved in a range of categories from energy performance and CO₂ efficiencies to pollution and building management.
- 3.15 BREEAM assessments and certifications will only be accepted if they have been carried out by a licensed BREEAM Accredited Assessor. The process for how the Council will assess planning applications in relation to the BREEAM requirement is set out below.

Stage 1 Pre-application

- Applicant to take account of the policy requirements of TP3 when developing their scheme.
- Developer appoints BREEAM assessor
- Preliminary assessment completed by an accredited and licensed BREEAM assessor.

Stage 2 Application

Outline

- Outline applications will be addressed on a case-by-case basis as the amount of detail which is provided can vary. A pre-assessment estimate can show what rating a project has the potential to achieve, typically based on available information, developer commitments and discussions with a BREEAM Assessor or Advisory Professional.
- Outline approval will be issued with a condition which requires the submission of an interim/ design stage assessment certificate at the full application/reserved matters stage. This condition will commit the development to achieving the BREEAM standard targeted at the outline stage. Post-construction assessments and certificates will also be conditioned with full planning permission and will need to be submitted before any part of the development can be occupied.

Detailed

- Interim certificate submitted as part of the planning application where available. If not available, a BREEAM preliminary assessment must be submitted and completed by an accredited and licensed BREEAM assessor.
- Financial viability assessment submitted if not achieving 'Excellent' standard. Further information on financial viability considerations is set out below.

Stage 3 Decision

- Grant of planning permission based on preliminary assessment or interim certificate.
- Planning condition requiring final BREEAM certification

Stage 4 Post Construction

- Post-Construction review/assessment conducted after which the BRE certification body will issue a final certificate confirming the BREEAM level attained.
- Post construction review/assessment and final certificate confirming the BREEAM level attained to be submitted to local planning authority after practical completion of the building works.

3.16 Each eligible building will require their own BREEAM assessment. Where there is an application for outline planning with reserved matters, a separate BREEAM certificate should be received for each of the qualifying buildings within the development.

What if 'Excellent' cannot be achieved?

3.17 Policy TP3 states that qualifying development should aim to meet BREEAM standard Excellent unless it can be demonstrated that the cost of achieving this would make the proposed development unviable.

3.18 It may be that a 'Very Good' rating can be achieved within a viable development instead of an 'Excellent' rating. If this is the case, the Council will accept a statement setting out a reasoned justification for achievement of a 'Very Good' rating.

3.19 For any rating below 'Very Good', the applicant would need to submit a financial viability assessment to demonstrate why the policy requirement could not be met. The local planning

authority will seek independent advice to review the evidence within the financial appraisal. The applicant will be required to meet the costs of any such review.²

BREEAM Standard to be achieved	Information required
Outstanding/ Excellent	None
Very Good	Reasoned justification statement
Good	Financial viability assessment
Pass	Financial viability assessment
None	Financial viability assessment

4. Policy TP4 Low and zero carbon energy generation

- 4.1 Policy TP4 requires all new development to incorporate the provision of low and zero carbon forms of energy generation or connect into a network where it exists, unless it can be demonstrated that the cost of achieving this would make the proposed development unviable.
- 4.2 The policy does not prescribe a % of energy to be generated by LZC technology. However, there is a clear policy expectation that some form LZC solution should be incorporated into new development schemes, unless unviable, to contribute to the overall carbon reduction target in policy TP1 Reducing the city’s carbon footprint.
- 4.3 This section explains how Policy TP4 will be applied by setting out the information expected from applicants to demonstrate that the policy requirements have been met, at what stage in the planning process information should be submitted, and how it would be assessed for compliance.
- 4.4 There are a range of technologies available to deliver these requirements including; solar thermal panels, photovoltaic cells, small wind power generators, biomass heating and hot water systems, ground source heat pumps, micro combined heat and power systems (powered by a renewable or low carbon fuel source) or energy efficient ventilations systems. This list is not exhaustive and non-conventional sources of generation will also be accepted.
- 4.5 Appendix 2 provides further detail on the types of low and zero carbon technologies that developers could incorporate into their schemes and the information that will be required from applicants to demonstrate compliance with the policy requirements.

What development does Policy TP4 apply to?

- 4.6 Policy TP4 applies to all new development. However, for major applications³ information will be required to be submitted in accordance with the Local Validation Requirements.

Information requirements

- 4.7 Applicants can use the following statements to show how their proposals contribute to sustainable design and construction:

² In the case of school buildings, information about how the building is to be funded, together with financial evidence to demonstrate that the cost of achieving the above requirements would make the scheme unviable will be accepted.

³ In the case of school buildings, information about how the building is to be funded, together with financial evidence to demonstrate that the cost of achieving the above requirements would make the scheme unviable will be accepted

- A section within the Design and Access Statement; or
- A separate Sustainable Construction Statement or Energy Statement; or
- A combined Sustainable Construction and Energy Statement

4.8 The level of information provided should be proportionate to the scale and nature of the development proposed. Sections 4.15 –4.19 of this document provides detailed guidance on the information required for outline planning applications and reserved matter and detailed planning applications. The statement should demonstrate compliance with Policy TP4. Detail on what should be included in an Energy Statement below and a suggested template/ structure for the technical data required is set out in Appendix 3.

Definitions

- 4.9 ‘Zero carbon energy’ generation refers to renewable energy. This would include wind, water, solar, geothermal and plant material (often referred to as biomass).
- 4.10 ‘Low carbon energy’ options cover a range of energy sources that are not renewable but can still produce less carbon than use of the conventional electricity grid or gas network. These options include waste heat, gas engine, gas turbine, where the heat is used (this might be Stirling engine or fuel cell, gas engine or gas turbine Combined Heat & Power (CHP), and the non-biodegradable fraction of the output from Energy from Waste (EfW) plant.
- 4.11 These definitions are consistent with NPPF definition of renewable and low carbon energy.

Multiple building schemes

- 4.12 Where a development consists of more than one building, a **site wide energy strategy** is required. The LZC energy system can be designed such that either:
- Each individual building independently incorporates the provision of low and zero carbon forms of energy generation, as set out in an agreed site wide energy strategy; or
 - The requirement is met for the development as a whole, as set out in the agreed site wide energy strategy, but without each individual building necessarily meeting it. If the development is to occur in phases, each phase must contribute to the delivery of the strategy at the time of its construction. Compliance cannot be deferred to a later phase unless by prior agreement of the Council.

Energy statement

- 4.13 The purpose of an Energy Statement is to explain the approach to be followed on energy efficiency and renewable energy measures and to demonstrate how these issues have been considered and designed into the development. There should be a clear site-wide strategy in place for the site, particularly for outline schemes where details will be more limited. The Energy Statement should show the “predicted energy demand” for the proposed scheme and the proportion that will be met from the generation of LZC energy (e.g. the installation of solar panels; ground source heat pumps etc.).
- 4.14 The Energy Statement should present technical data while remaining easy to read and understand. Although the presentation of the data will be a matter of choice for the applicant, it should include the following.

The ‘predicted baseline energy demand’ using benchmark data (SAP⁴ or SBEM⁵) indicating the sources of the data used. For the purposes of this policy, predicted energy demand is the total energy used in the development – both regulated and unregulated energy. Regulated energy is covered by the Building Regulations and includes that used for space heating, hot water and to run pumps and fans. Unregulated energy is the remaining energy used and includes the running of appliances/ equipment and for cooking.

Energy efficiency measures (over and above the minimum requirements of the current Building Regulations) explored and proposed including the predicted energy savings in kWh/m²/annum. Examples include highly efficient appliances and equipment, building control systems, fabric insulation, heating systems, lighting and performance windows and doors providing they are above those specified for Buildings Regulations. The ‘predicted energy demand’ will be reduced through installing energy efficiency measures. (There is an interrelationship here with the BREEAM as to gain a certain BREEAM rating; various credits must be achieved in a relation to energy performance and CO₂ efficiencies).

Low and zero carbon energy technologies. Assessment of possible LZC options, including connecting into LZC generation networks where they exist. The site context may present opportunities for certain technologies, including close proximity to EfW facilities, or the canal / major water bodies for water-based heat. For residential schemes over 200 dwellings or non-residential developments over 1,000m², CHP must be an option assessed. For those technologies which are deemed to be potentially suitable, an indication of the predicted energy demand that could be met by those options. Reasons for discounting certain technologies and selection of the preferred technology with full details of the selected technology is required as set out below.

Information required for Outline Applications

- 4.15 At the outline planning stage the available information will be limited. However, it is important for consideration to be given at an early stage to how the LZC requirement and carbon reduction will be met, as there may be implications for the design and cost of the development.
- 4.16 Where there is an application for outline planning with reserved matters, each stage of the development should be revisited by way of an updated Energy Statement. The Council will secure the key energy commitments in the agreed strategy through appropriate clauses in a section 106 agreement or through an appropriate planning condition.
- 4.17 For outline applications the following information should be submitted:
- An executive summary setting out the energy efficiency measures and low and zero carbon forms of energy generation that are being proposed to be used on the site.
 - Assessment of the predicted annual energy demand and carbon emissions – using published benchmarking data such as SAP or SBEM indicating the sources of the data used.

⁴ Standard Assessment Procedure (SAP) - a methodology for assessing and comparing the energy and environmental performance of dwellings. Its purpose is to provide accurate and reliable assessments of dwelling energy performances that are needed to underpin Building Regulations and other policy initiatives.

⁵ Simplified Building Energy Model (SBEM) - a computer program that provides an analysis of a building’s energy consumption. The purpose of the software is to produce consistent and reliable evaluations of energy use in non-domestic buildings for Building Regulations compliance

- Outline assessment/ initial feasibility test for possible energy efficiency measures (over and above the minimum requirements of the current Building Regulations) including predicted energy savings in kWh/m²/ annum
- Outline assessment/ initial feasibility test for possible renewable/low carbon options (including connecting into LCZ generation networks where they exist) and, for those technologies which are deemed to be potentially suitable, an indication of the predicted energy demand that could be met by those options, carbon emission reductions, estimated capital costs, availability of grant funding, etc. (See Appendix 2).
- One of the potential options to be investigated must include CHP for residential developments over 200 units and non-residential development over 1,000m²
- Reasons for ruling out a particular technology or option providing a clear justification outlining the technical and/ or viability reasons.
- Where it is not considered possible to incorporate **any** LDC energy generation into a proposed development due to financial reasons, a **financial viability assessment** must be submitted to demonstrate this. The local planning authority will seek independent advice to review the evidence within the financial appraisal. The applicant will be required to meet the costs of any such review.
- Evidence of investigation into existing or planned district heating networks that the development could be connected to for all applications for major development.
- Consideration of relevant energy and heating studies impacting the wider area.

4.18 When the reserved matters application is submitted it should be accompanied by an updated Design and Access Statement or Energy Statement.

Information required for Full or Reserved Matters applications

4.19 Full (and reserved matters) planning applications must provide a detailed energy assessment which includes the information set out Appendix 2 of this note. An overview of what should be submitted is set out below:

- An executive summary setting out the details of the energy efficiency measures and low and zero carbon forms of energy generation that are being proposed to be used on the site and how it delivers the site wide energy strategy.
- Assessment of the predicted annual energy demand and carbon emissions – using published benchmarking data such as SAP or SBEM indicating the sources of the data used.
- Full/ detailed assessment of possible energy efficiency measures (over and above the minimum requirements of the current Building Regulations) including predicted energy savings in kWh/m²/ annum
- Full/ detailed assessment of renewable / low carbon energy options, to include:
 - Assessment of a range of LDC technologies suitable for supplying site networks that may feed both non-domestic and residential buildings; including connecting into LDC generation networks where they exist. An indication of the predicted energy demand that could be met by those options, carbon emission reductions, estimated capital costs, availability of public sector funding, etc. (See Appendix 2).
 - Analysis of CHP as an option must be included for residential developments over 200 units and non-residential development over 1,000m²
 - Reasons for ruling out a particular technology or option providing a clear justification outlining the technical and/ or viability reasons
- Full details of the selected technology (or technologies), to include:
 - System description, supported by site plans
 - Reason for proposing the chosen technology
 - Installed capacity and estimated output

- Site specific design requirements
- Detailed plan showing where the technology would be installed
- Relevant operational considerations. These will depend on the technology but may include: fuel storage and delivery arrangements, avoidance of nuisance and air quality issues and arrangements for maintenance.
- Where it is not considered possible to incorporate LZC energy generation into a proposed development due to financial reasons, a financial viability assessment must be submitted to demonstrate this. The local planning authority will seek independent advice to review the evidence within the financial appraisal. The applicant will be required to meet the costs of any such review.
- Evidence of investigation into existing or planned district heating networks that the development could be connected to for all applications for major development
- Consideration of relevant energy and heating studies impacting the wider area.

District Heat Networks

- 4.20 For 'smaller' developments the policy requires connection to a district heat network if there is one available, subject to it being practical and viable. For the purposes of this policy, smaller development is defined as residential developments of 10 or more units, but less than or equal to 200 units and non-residential developments of 1,000m² in the aggregate (GIA) or less (excluding any part of a mixed-use site used for dwellings).
- 4.21 Full exploration of the practicality and viability of connection to a district heat network should be undertaken. If a decentralised energy and heat network or a connection to an existing one is proposed by the applicant, details of how it will be planned, installed, operated and funded will need to be provided, including details of its maintenance.
- 4.22 If an applicant considers that it is not practical or viable to connect to a district heating scheme, this should be demonstrated and supported by evidence such as a viability assessment or a technical assessment.

Appendix 1: Types of buildings that can be assessed using the BREEAM New Construction 2018 scheme version

Non-domestic building types covered under BREEAM New Construction 2018

Building type	Description
Commercial	
Office	<ul style="list-style-type: none"> • General office buildings • Offices with research and development areas (i.e. category 1 labs only)
Industrial	<ul style="list-style-type: none"> • Industrial unit – warehouse storage or distribution • Industrial unit – process, manufacturing or vehicle servicing
Retail	<ul style="list-style-type: none"> • Shop or shopping centre • Retail park or warehouse • 'Over the counter' service provider, e.g. financial, estate and employment agencies and betting offices • Showroom • Restaurant, café and drinking establishment • Hot food takeaway
Public (non-housing)	
Education For schools, further and higher educational building types, see also Appendix B – Education building types.	<ul style="list-style-type: none"> • Preschool • Schools and sixth form colleges • Further education or vocational colleges • Higher education institutions
Healthcare For healthcare building types, see also Appendix A – Healthcare building types.	<ul style="list-style-type: none"> • Teaching or specialist hospitals • General acute hospitals • Community and mental health hospitals • GP surgeries • Health centres and clinic
Prison The prisons category includes any building type that is part of a prison establishment, including residential blocks or a hybrid of building types.	<ul style="list-style-type: none"> • High security prison • Standard secured prison • Young offender institution and juvenile prisons • Local prison • Holding centre
Law Court	<ul style="list-style-type: none"> • Law courts • Crown and criminal courts • County courts • Magistrates' courts • Civil justice centres • Family courts • Youth courts • Combined courts
Multi-residential accommodation or supported living facility	For multi-residential building types, see also Appendix C – Multi-residential building types for further detail of scope

Building type	Description
Residential institution (long term stay)	<ul style="list-style-type: none"> • Residential care home • Sheltered accommodation • Residential college or school (halls of residence) • Local authority secure residential accommodation • Military barracks
Other	
Residential institution (short term stay)	<ul style="list-style-type: none"> • Hotel, hostel, boarding and guest house • Secure training centre • Residential training centre
Non-residential institution	<ul style="list-style-type: none"> • Art gallery, museum • Library • Day centre, hall, civic or community centre • Place of worship
Assembly and leisure	<ul style="list-style-type: none"> • Cinema • Theatre, music or concert hall • Exhibition or conference hall • Indoor or outdoor sports, fitness and recreation centre (with or without pool)
Other	<ul style="list-style-type: none"> • transportation hub (coach or bus station and above ground rail station) • Research and development (category 2 or 3 laboratories - non-higher education) • Crèche • Fire stations • Visitor centres
Bespoke	<p>Building types that are not listed in this table must undergo a scoping and tailoring exercise to facilitate an assessment and rating. For an individual project this involves BRE Global selecting appropriate issues from the existing pool of assessment issues to provide criteria against which the building can be assessed. This is sometimes known as a 'bespoke' assessment. Further guidance on the 'bespoke' process can be found in BREEAM Bespoke Process Guidance Note GN23.</p>

Appendix 2: Energy Statement Suggested Outline Structure

1. Executive Summary

This should be a non-technical summary setting out the options explored and CO₂ savings from energy efficiency, CHP and other LCZ technologies explored compared to the baseline position.

Site specific infrastructure viability must consider the availability of public sector funding, the income the operator will receive from any scheme and cost savings to occupiers compared to the baseline.

The applicant must outline the reasons for selecting the preferred strategy which will be based on a balanced consideration of the policy requirements, financial viability and technical feasibility.

Summary table

	Energy demand (kWh/yr)	Energy consumption savings (%)	CO ₂ emissions (kg/yr)	CO ₂ emission savings (%)
Building Regulations Part L 2013 compliant development (Baseline)				
Proposed scheme after energy efficiency measures *				
Proposed scheme after CHP savings *				
Proposed scheme after other low and zero carbon technologies *				
Total savings (against baseline)				

* if applicable

2. Calculate baseline energy demand

This should include a breakdown of both regulated and un-regulated energy use. Regulated energy consumption should be calculated through SAP/SBEM while un-regulated emissions should be also measured.

Energy Demand	Baseline* Energy Demand (kWh/yr)	Baseline* CO ₂ Emissions Kg/CO ₂ /yr
Heating		
Hot water		
Lighting		
Auxiliary		
Cooling (if applicable)		
Cooking and Appliances (if applicable)		
Other?		
Total heat and hot water		
Total electricity		
Total		

*The baseline needs to comply with the Building Regulation Part L 2013. Any assumptions need to be mentioned.

3. Energy efficiency measures

Full assessment of possible energy efficiency measures (over and above the minimum requirements of the current Building Regulations) including predicted energy savings in kWh/m²/ annum and carbon reduction against baseline scheme.

Energy efficiency measure	Baseline		Proposed Scheme with energy efficiency measures*	
	Energy Demand (kWh/yr)	CO ₂ Emissions Kg/CO ₂ /yr	Energy Demand (kWh/yr)	CO ₂ Emissions Kg/CO ₂ /yr
Total				

4. Low and Zero Carbon Energy Generation Feasibility

Full assessment of LZC options suitable for supplying site networks that may feed both non-domestic and residential buildings; including connecting into LZC generation networks where they exist and predicted energy savings in kWh/m²/ annum and carbon reduction.

Performance	Combined Heat and Power	Solar Photovoltaics System	Solar Thermal System	Air Source Heat Pump	Ground Source Heat Pump	Biomass	Wind	Other
Capacity (kW)								
Estimate Annual Energy provided								
Estimated Capital Cost (£)								
Estimated Annual Income (£)								
Estimated Energy Cost Savings (£)								
Simple Payback Period (years)								
Annual CO ₂ Emissions Reduction (%)								
Approximate size								
Available Grants								
Additional considerations								
Recommended for further consideration								

Reasons for ruling out a particular technology or option providing a clear justification outlining the technical and/ or viability reasons.

Where it is not considered possible to incorporate any LZC energy generation into a proposed development due to financial reasons, a financial viability assessment must be submitted to demonstrate this. The local planning authority will seek independent advice to review the evidence within the financial appraisal. The applicant will be required to meet the costs of any such review.

5. Details of selected technology

Full details of the selected technology (or technologies) must be provided. This should include the following (where relevant):

Technology	Information Required
Combined Heat and Power and District Heating	<ul style="list-style-type: none"> • Description of technology including fuel type to be used • Capacity – plant specification, electrical output (KWe), heat output (KWth) • Estimated energy generation (KWh/yr) for electricity and heat separately • Layout plan showing site size, boundary and location of infrastructure (e.g. location of boiler house, CHP units and boilers, storage area) • Floor plans and elevations • Details of connection to distribution network • Noise and visual impact assessment • Details of operation and management of installations • Where appropriate, source of fuel supply, principle transport routes to and from the supply • Details of vehicle access to and from the plant and estimated vehicle movements
Solar Thermal Systems and Photovoltaics	<ul style="list-style-type: none"> • Description of technology • Capacity- electrical output (KWp), number of panels or tubes, total area • Estimated energy generation (KWh/yr) • Design of the module or array (Photovoltaics) • Elevations to show proposed location • Orientation/roof pitch • Roof plans and detail of roof mounting arrangement and methods of fixing, if applicable • Potential shading from trees and other buildings • Visual impact assessment
Wind Turbines	<ul style="list-style-type: none"> • Description of technology • Capacity- electrical output (KW) • Estimated energy generation (KWh/yr) • Layout plan showing the site size, boundary and location of infrastructure (e.g. location of turbines, sub-station, access tracks) • Elevation plan • Roof plan to show location of wind turbine (if roof mounted) • Average site wind speed (minimum 12 months) and further information to fully demonstrate that the proposed wind turbine would actually deliver the wind output claimed • Grid connection • Proximity to the dwellings • Noise, vibration and visual impact assessment • For large wind turbines further information will be required, including topple zones, radar interference, microwave transmission buffers, archaeological assessment, consideration of impact on birds/bats etc. and Air Traffic Control.

Technology	Information Required
	<ul style="list-style-type: none"> • Evidence of consultation with Network Rail to establish if there would be any potential impacts on rail infrastructure e.g. topple zones, cabling, vibration impacts, radio/signalling impacts, shadow flicker.
Hydroelectric	<ul style="list-style-type: none"> • Description of technology • Layout plan showing location of turbine • Elevations and size of turbine • Capacity-electrical output (KW) • Estimated energy generation (KWh/yr)
Ground Source Heating/Cooling	<ul style="list-style-type: none"> • Description of technology • Capacity-for heating and cooling (KW) • Estimated energy generation (KWh/yr) • Number and location of boreholes/trenches • Location of pipe work • Connection details to the building • Plan showing tree locations and their potential rooting zones • Archaeological assessment, where applicable
Air Source Heat Pump	<ul style="list-style-type: none"> • Description of technology e.g. air-to air, air-to water system • Capacity-for heating and cooling (KW) • Estimated energy generation (KWh/yr) • Elevations to show location and design • Visual impact assessment • Noise report (should be available from the manufacturer)
Biomass	<ul style="list-style-type: none"> • Description of technology and fuel supply • Capacity – boiler specification (KW) • Estimated energy generation (KWh/yr) • Floor plans and elevations showing the location and design of the plant, flue and storage facilities; • Details of vehicle access to and from the plant and estimated vehicle movements • Source of fuel supply, principle transport routes to and from the supply • Landscaping and visual impact of plant

